March 10, 2009
Revision 0

Puncher Unit-BF1/ -BG1/ -BH1

Service Manual

Product Outline
Function
Parts Replacing and Cleaning
Installation

1 2 3 4

Appendix

Application

This manual has been issued by Canon Inc. for qualified persons to learn technical theory, installation, maintenance, and repair of products. This manual covers all localities where the products are sold. For this reason, there may be information in this manual that does not apply to your locality.

Corrections

This manual may contain technical inaccuracies or typographical errors due to improvements or changes in products. When changes occur in applicable products or in the contents of this manual, Canon will release technical information as the need arises. In the event of major changes in the contents of this manual over a long or short period, Canon will issue a new edition of this manual.

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Caution

Use of this manual should be strictly supervised to avoid disclosure of confidential information.

Explanation of Symbols

The following symbols are used throughout this Service Manual.

Symbols	Explanation
	Check.
	Check visually.
	Check the noise.
	Disconnect the connector.
	Connect the connector.
	Remove the cable/wire from the cable guide or wire saddle.
	Set the cable/wire to the cable guide or wire saddle.
	Remove the screw.
	Tighten the screw.

Symbols	Explanation
	Remove the claw.
	Insert the claw.
	Use the bundled part.
	Push the part.
	Plug the power cable.
	Turn on the power.

The following rules apply throughout this Service Manual:

1. Each chapter contains sections explaining the purpose of specific functions and the relationship between electrical and mechanical systems with reference to the timing of operation.

   In the diagrams, ▬▬ represents the path of mechanical drive; where a signal name accompanies the symbol, the arrow ⟶ indicates the direction of the electric signal. The expression "turn on the power" means flipping on the power switch, closing the front door, and closing the delivery unit door, which results in supplying the machine with power.

2. In the digital circuits, '1' is used to indicate that the voltage level of a given signal is "High", while '0' is used to indicate "Low". (The voltage value, however, differs from circuit to circuit.) In addition, the asterisk (*) as in "DRMD*" indicates that the DRMD signal goes on when '0'.

   In practically all cases, the internal mechanisms of a microprocessor cannot be checked in the field. Therefore, the operations of the microprocessors used in the machines are not discussed: they are explained in terms of from sensors to the input of the DC controller PCB and from the output of the DC controller PCB to the loads.

The descriptions in this Service Manual are subject to change without notice for product improvement or other purposes, and major changes will be communicated in the form of Service Information bulletins.
All service persons are expected to have a good understanding of the contents of this Service Manual and all relevant Service Information bulletins and be able to identify and isolate faults in the machine.

□□□□□

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Operation Check

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General Circuit Diagram 5-2

Safety Precautions

- Notes Before it Works Serving

Notes Before it Works Serving

Caution:
When servicing, be sure to follow the specified procedure. Before starting the service work, be sure to turn off the host machine and finisher and unplug the finisher.

Caution:
Never turn off the host machine or finisher during downloading. If you do so, this equipment may become inoperative.

1

Product Outline

- Features
- Specifications
- Names of Parts

Features

High-accuracy Punch Mode

Allows setting of punch hole position accuracy by selecting a user mode (normal mode or high-accuracy mode).

Compact Design

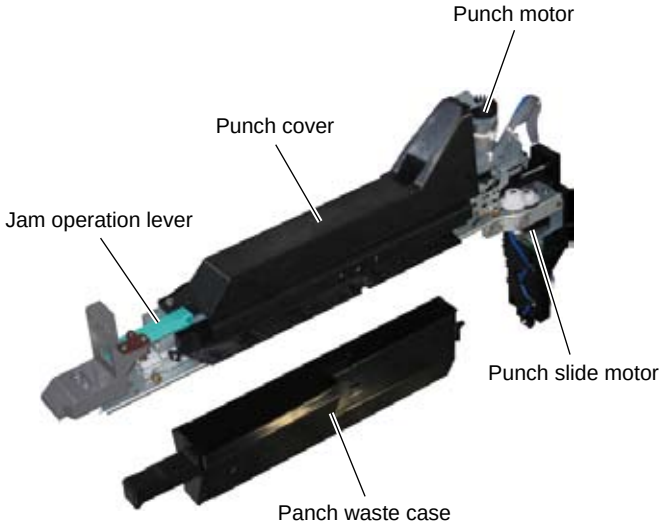
Installable in the finisher, requiring a small room.

Specifications

Punching method	Spinning punching (Sequential punch-ing)
Paper weight	52 g/m2 to 256 g/m2
Paper size	<2 or 3 holes (Puncher Unit-BF1)> A3, A4, 11" x 17", LGL*1, LTR, LTRR*1, EXEC *1: 2 holes only <2 or 4 holes (Puncher Unit-BG1)> A3, B4, A4, A4R, B5, B5R, 11" x 17", LGL, LTR, LTRR, EXEC, EXECR <4 holes (Puncher Unit-BH1)> A3, A4
Punched hole diameter	2 or 3 holes: 8.0 mm 2 or 4 holes: 6.5 mm 4 holes: 6.5 mm
Panch waste case capacity	2 or 3 holes: 4,500 sheets or more 2 or 4 holes: 5,000 sheets or more 4 holes: 5,000 sheets or more
Dimensions	95(W) x 715(D) x 392 (H) mm
Weight	Approx. 4 kg
Power supply	Powered from finisher

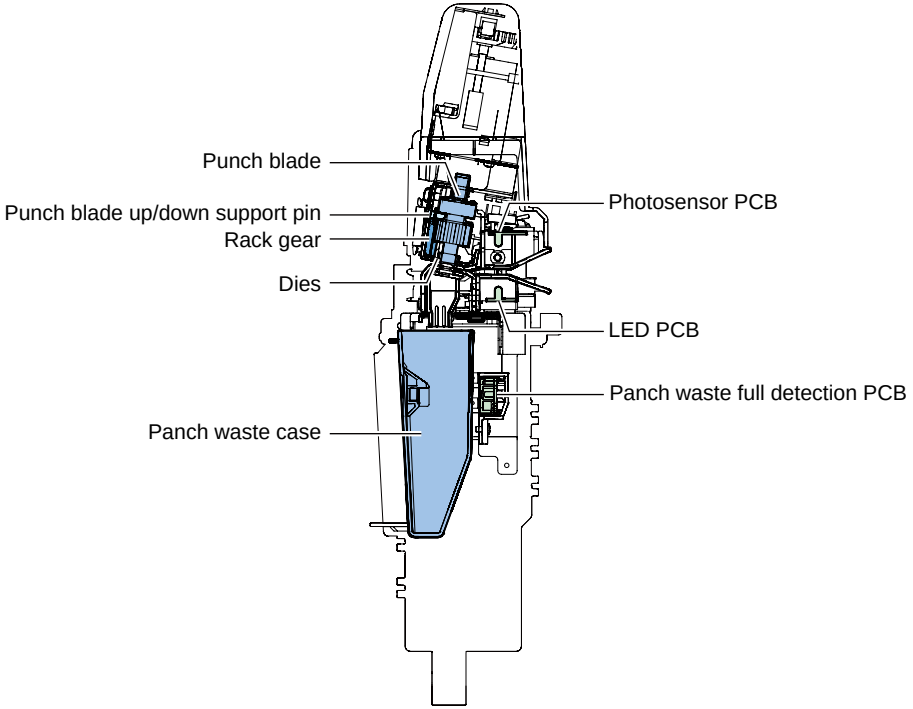
Names of Parts

External View



F-1-1

Cross Section



F-1-2

2

Technology

- Basic Configuration
- Controls

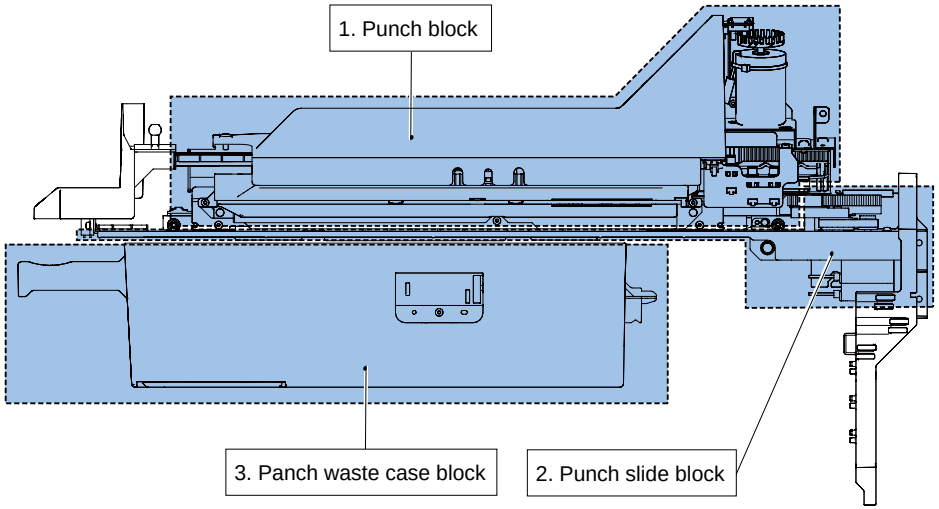
Basic Configuration

Functional Configuration

This equipment mainly consists of a punch block, punch slide block, and punch waste case block.

Punch block [1]	Makes punch holes at the rear end of paper.
Punch slide block [2]	Moves the punch block to the punching position (rear end of paper) according to the paper size.
Punch waste case block [3]	Collects the punch waste generated when punch holes are made at the rear end of paper.

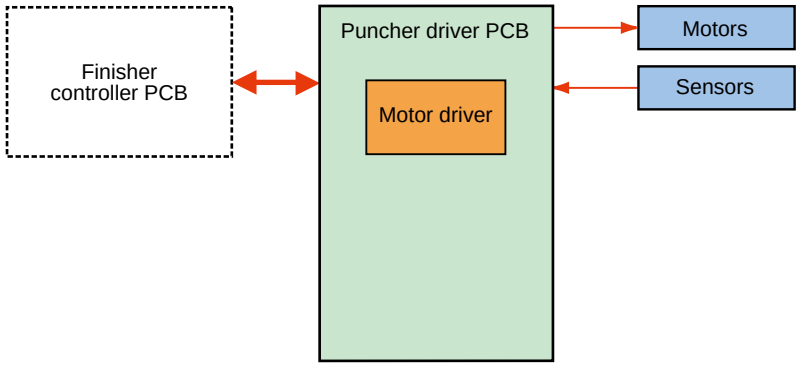
MEMO:
This equipment does not incorporate a microcomputer. It is controlled by the finisher controller PCB incorporated in the finisher.



F-2-1

Overview of Electrical Circuitry

Electric control of this equipment is performed by the finisher (finisher controller PCB) and puncher driver PCB.

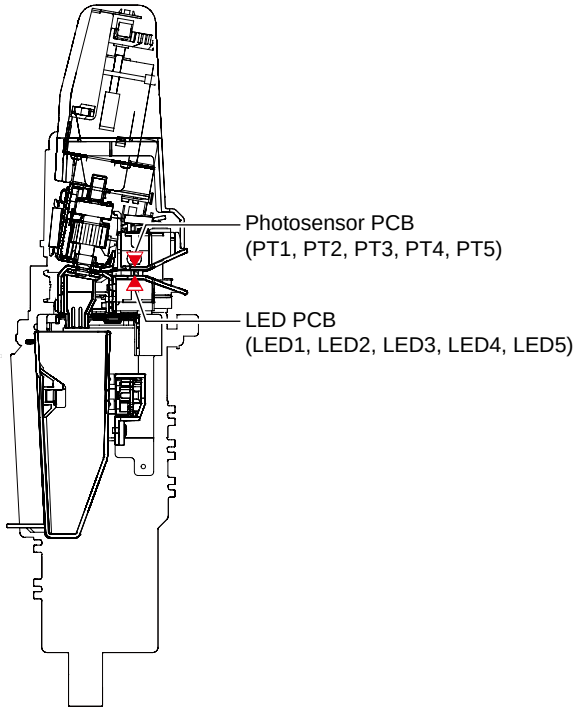


F-2-2

Component Configuration

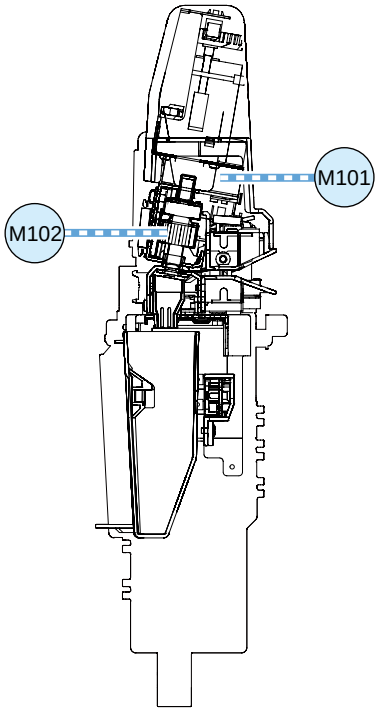
Sensor Layout

Only the optical sensors on the feed path are shown below.



F-2-3

Drive Configuration



F-2-4

M101: Punch slide motor

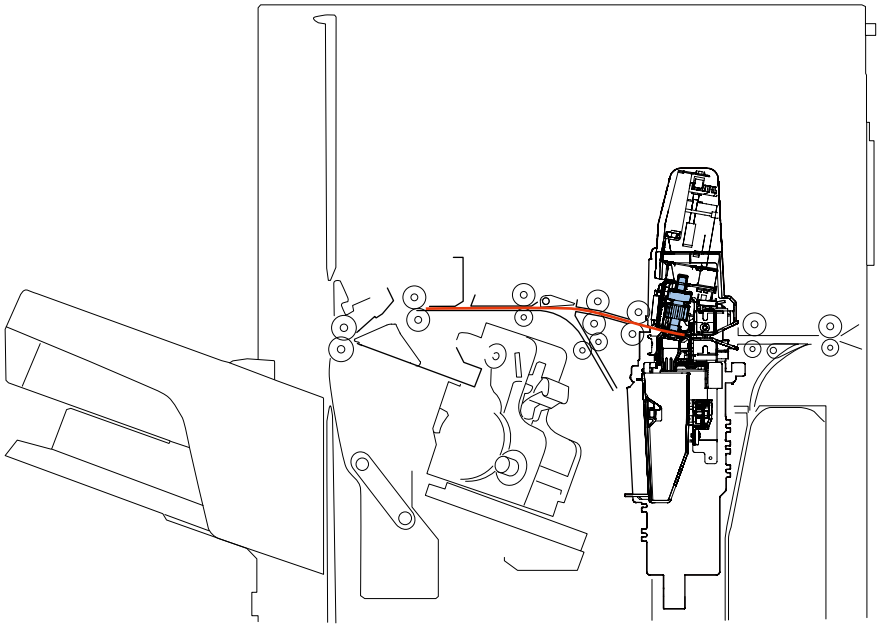
M102: Punch motor

Basic Operation Outline

This equipment makes punch holes at the rear end of paper.

This equipment is optionally available and installed in the feed path inside the finisher.

The paper fed to the punch block stops at the punching position temporarily. After this, the rack gear is driven back and forth to move the punch blades vertically, making punch holes. These operations are controlled by the finisher controller PCB. Every part of the puncher is driven by the puncher driver PCB.



F-2-5

Controls

Overview

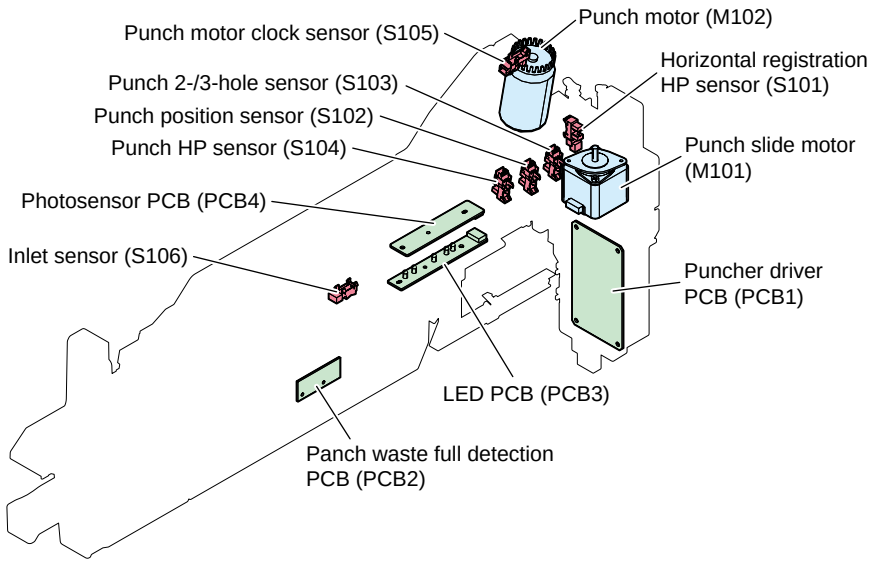
This unit is located in the feed path inside the finisher and sequentially punches holes once the media stops.

The media loaded from the host machine is fed by the inlet roller and feed roller of the finisher. When the trailing edge of the media reaches a prescribed location, the media is stopped for a moment and punched at the trailing edge.

The name and role of motors and sensors used for punching are shown below.

Motor	Function	Reference
Punch slide motor (M101)	Drives the punch slide unit.	-
Punch motor (M102)	Drives the punch unit.	-

Motor	Function	Reference
Horizontal registration HP sensor (S101)	Detects the punch slide unit home position.	-
Punch position sensor (S102)	Detects the punch blade position.	-
Punch 2-/3-hole sensor (S103)	Detects the punch hole change.	-
Punch HP sensor (S104)	Detects the punch blade home position.	-
Punch motor clock sensor (S105)	Detects the punch motor clock.	-
Inlet sensor (S106)	Detects the feeding of media.	-
Punch waste full detection sensor (LED1, PT1(PCB2))	Detects when punch waste is full.	-
Horizontal registration sensor (LED1 ~ LED5(PCB3)/PT1 ~ PT5(PCB4))	Detects the media far side edge position.	-


Punch motor clock sensor (S105)
Punch motor (M102)
Horizontal registration HP sensor (S101)
Punch 2-/3-hole sensor (S103)
Punch position sensor (S102)
Punch HP sensor (S104)
Punch slide motor (M101)
Photosensor PCB (PCB4)
Inlet sensor (S106)
Puncher driver PCB (PCB1)
LED PCB (PCB3)
Panch waste full detection PCB (PCB2)

F-2-6

Construction of the Control System

The puncher unit consists of a die and hole puncher (punch blade).

The punch blade is driven by the punch motor (M102). The punch motor (M102) drives the rack gear back and forth. This moves the punch blade up and down with the punch blade up/down support pin to perform punching.

The home position of the punch blade is detected by Punch 2-/3-hole sensor (S103) and punch HP sensor (S104), and the lowering position of the punch blade is detected by the punch position sensor (S102).

The punch motor (M102) is a DC motor. In order to accurately stop the punch motor (M102) at home position, the punch motor clock sensor (S105) counts the prescribed number of clocks and stops the punch motor.

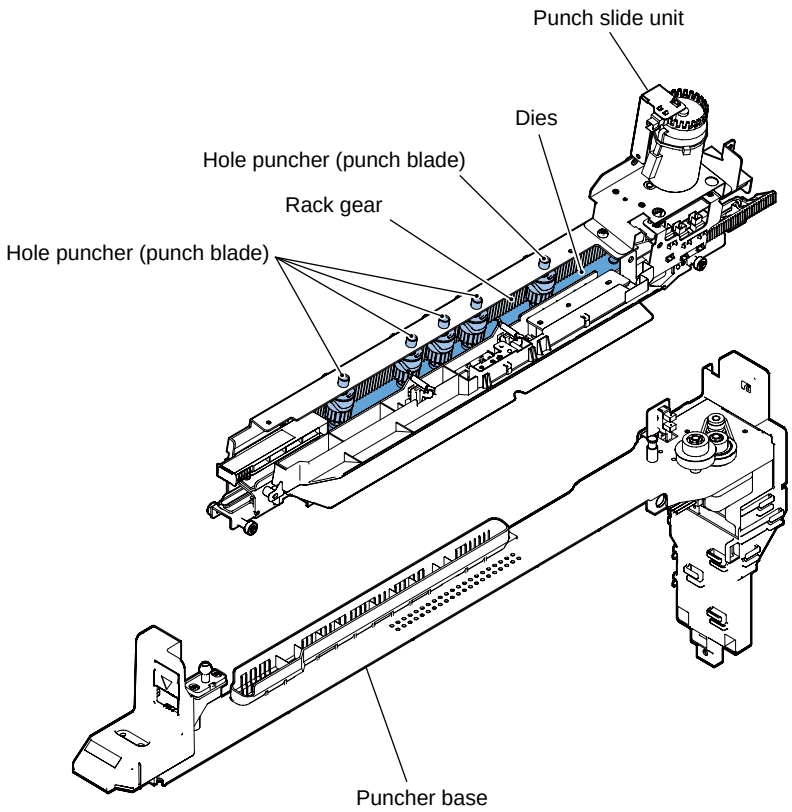
There is an inlet sensor (S106) at the entrance of the puncher unit to detect the leading and trailing edge of the media. The inlet media feed path of the puncher unit has 5 photo receiving transistors (photosensor PCB) on the upper side and five sets of LEDs (LED PCB) on the lower side to function as 5 sensors. These are horizontal registration sensor used to detect the media far side position to determine the position to punch holes.

The punch motor, punch unit, and above sensors form the punch slide unit which moves back and forth according to the media size. The back and forth movement is driven by the punch slide motor (M101).

The home position of the punch slide unit is detected by the horizontal registration HP sensor (S101). The punch slide motor (M101) is a 2 phase stepping motor.

Punch motor and punch slide motor are driven by the puncher driver PCB with control signal from the finisher controller PCB.

The punch waste generated by punching operation is collected in the punch waste case. The filling of punch waste is detected by a reflective type sensor (LED1/PT1 on punch waste full detection PCB).



F-2-7

Punch operation

The hole puncher is driven by the punch motor (M102). The home position of the hole puncher is detected by the punch position sensor (S102) and punch HP sensor (S104). Home position is reached when the two sensors both detect the sensor flag.

Punch operation is performed by driving the rack gear back and forth with the punch motor (M102) and lifting the hole puncher through the punch lifter pin. The rack gear has sensor flags and the punch operation is detected by the combination of these sensor flags and 3 sensors (punch position sensor (S102), punch 2-/3-hole sensor (S103), and punch HP sensor (S104)).

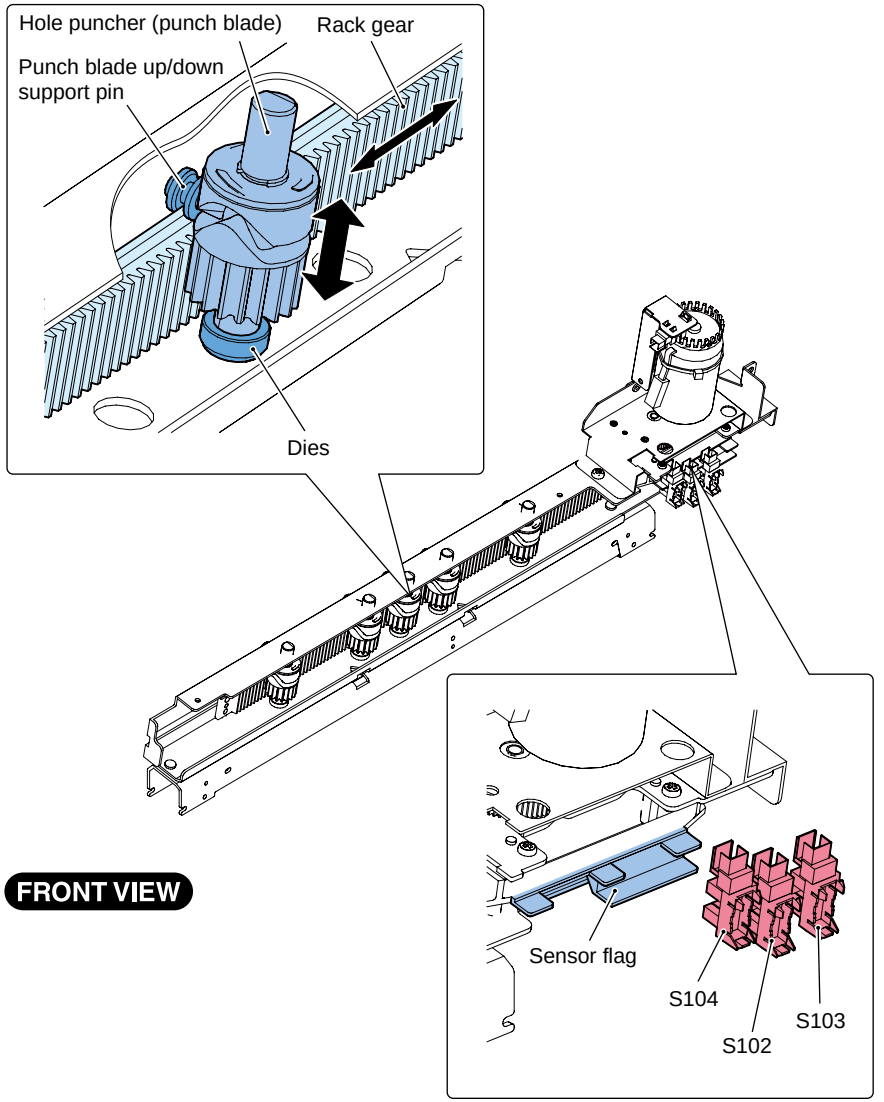
The items controlled by the combination of sensor flags and sensors are shown below.

- If 2 hole type/2 hole type Puncher Unit-BF1/2 hole type Puncher Unit-BG1/Puncher Unit-BH1.

Hole puncher condition		Punch HP sensor (S104)	Punch position sensor (S102)	Punch 2-/3-hole sensor (S103)
Home position (raised position)	Hole punching operation; 1 cycle	ON	ON	OFF
Lowered position		OFF	OFF	OFF
Raised position		ON	OFF	OFF

- If 3 hole type Puncher Unit-BF1/4 hole type Puncher Unit-BG1. The rack gear of the puncher unit that punches two types of holes is driven back and forth from the home position in the range opposite to the above.

Hole puncher condition		Punch HP sensor (S104)	Punch position sensor (S102)	Punch 2-/3-hole sensor (S103)
Home position (raised position)	Hole punching operation; 1 cycle	ON	ON	OFF
Lowered position		OFF	ON	ON
Raised position		ON	OFF	ON

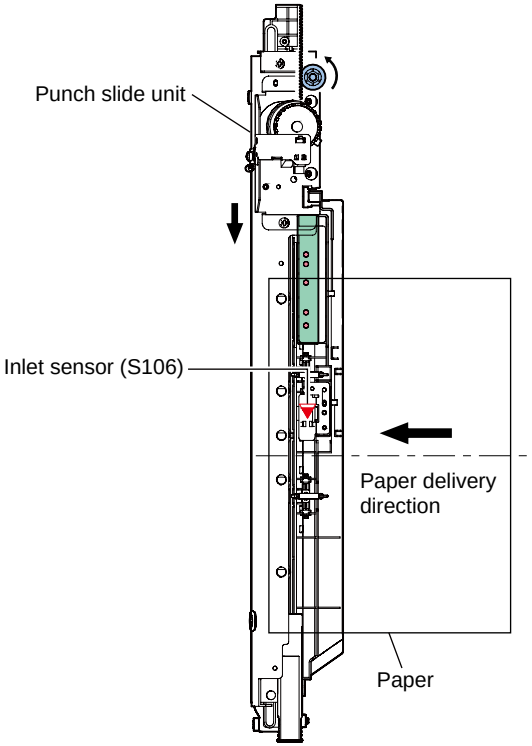


F-2-8

Horizontal registration operation

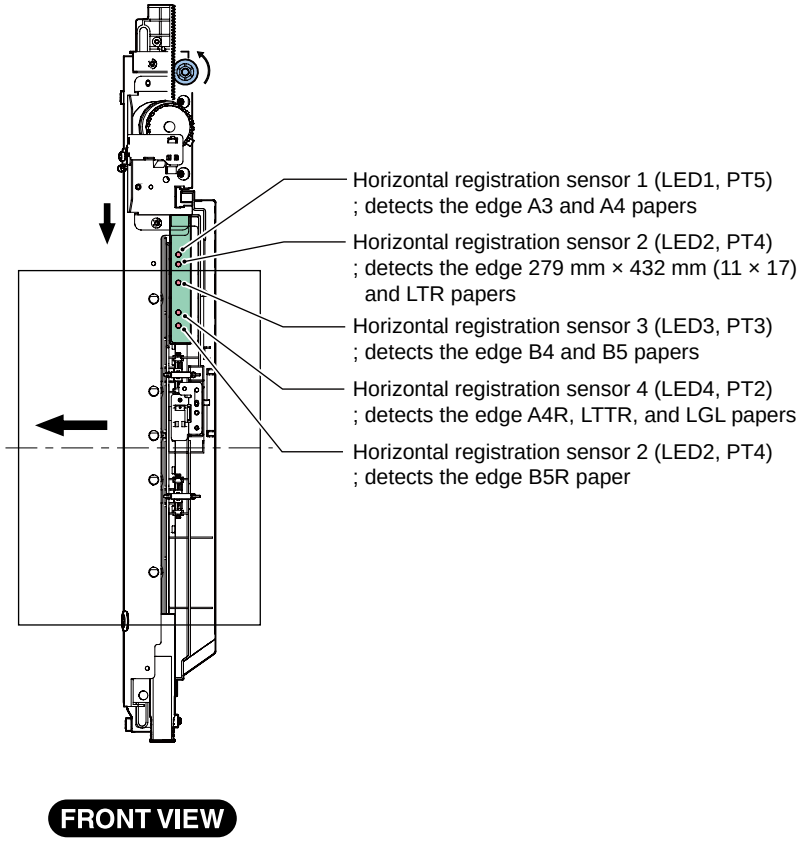
The punch slide unit is driven by the punch slide motor (M101) to perform horizontal registration. The home position of the punch slide unit is detected by the horizontal registration HP sensor (S101). The punch slide unit detects the leading edge of the media with the inlet sensor (S106) and horizontal registration sensor (LED1 to 5 on the LED PCB, PT1 to 5 on the photosensor PCB) and moves to the trailing edge of the media according to the media size. The horizontal registration operation is as follows:

1) When the leading edge of the media is detected by the inlet sensor (S106) of the puncher unit, the punch slide motor (M101) starts to move the punch slide unit to the front side.



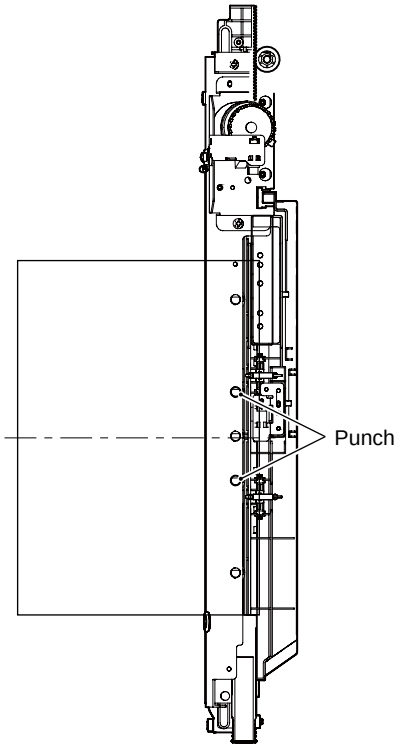
F-2-9

2) After the horizontal registration sensor (LED1 to 5, PT1 to 5) detects the far end of the media with the size signal sent from the host machine, the punch slide motor (M101) drives further to the front side prescribed position and stops the punch slide unit.


Horizontal registration sensor 1 (LED1, PT5)
; detects the edge A3 and A4 papers
Horizontal registration sensor 2 (LED2, PT4)
; detects the edge 279 mm × 432 mm (11 × 17) and LTR papers
Horizontal registration sensor 3 (LED3, PT3)
; detects the edge B4 and B5 papers
Horizontal registration sensor 4 (LED4, PT2)
; detects the edge A4R, LTTR, and LGL papers
Horizontal registration sensor 2 (LED2, PT4)
; detects the edge B5R paper
FRONT VIEW

F-2-10

3) Feeding of media is stopped when the inlet sensor (S106) detects the trailing edge of the media and the media is switched back and bumped to the stopper and registered. Then the punch motor (M102) is driven to punch the media.



F-2-11

4) When punching ends, the punch slide motor (M101) is reversed to return the punch slide unit to home position and stopped.

5) The punch slide unit returns to the home position after punching each sheet and repeats the above procedure even if the media is fed continuously.

Servicing Work

Scheduled Servicing

Item	Part name	Expected service life	Qty	Operation	Reference
Periodically replaced parts	None				
Consumable parts	None				
Periodically serviced parts	None				

Upgrade

Since this equipment does not incorporate a CPU, upgrade is not required. Carry out upgrade on the finisher side.

3

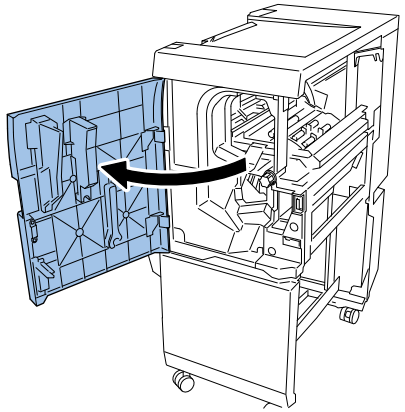
Parts Replacement and Cleaning Procedure

- Removing this Equipment
- List of Parts

Removing this Equipment

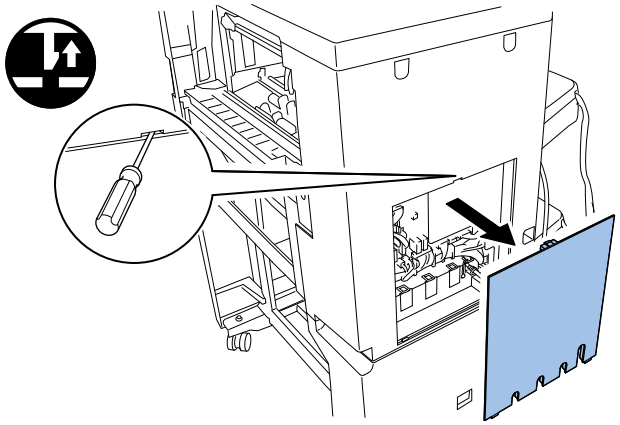
Removing from the finisher

1) Open the finisher front door.



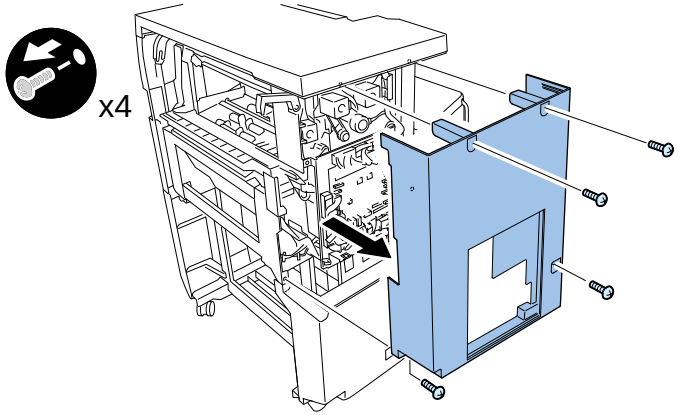
F-3-1

2) Remove the finisher rear center cover with a flat head screwdriver.



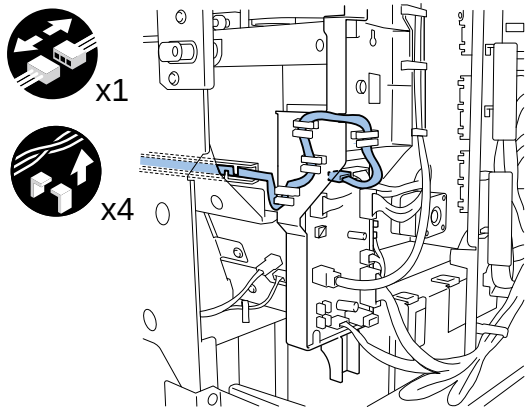
F-3-2

3) Remove 4 screws and remove the finisher rear cover.



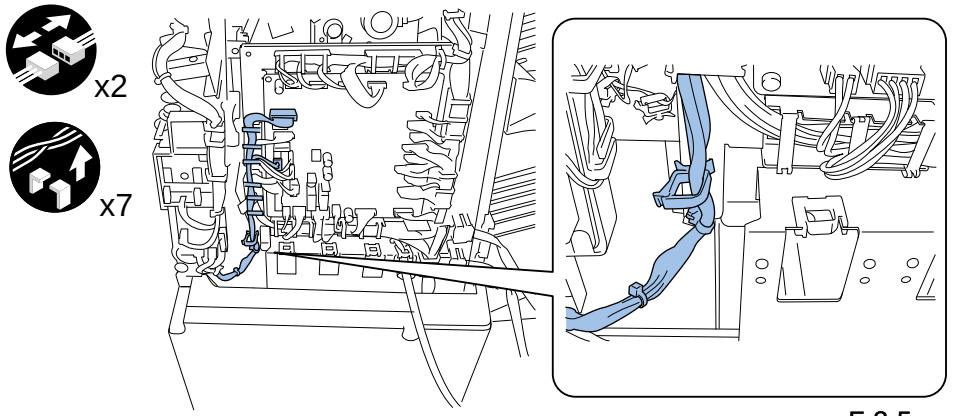
F-3-3

4) Remove the punch controller PCB connector (CN4) and remove the punch waste full sensor cable from the cable guide.



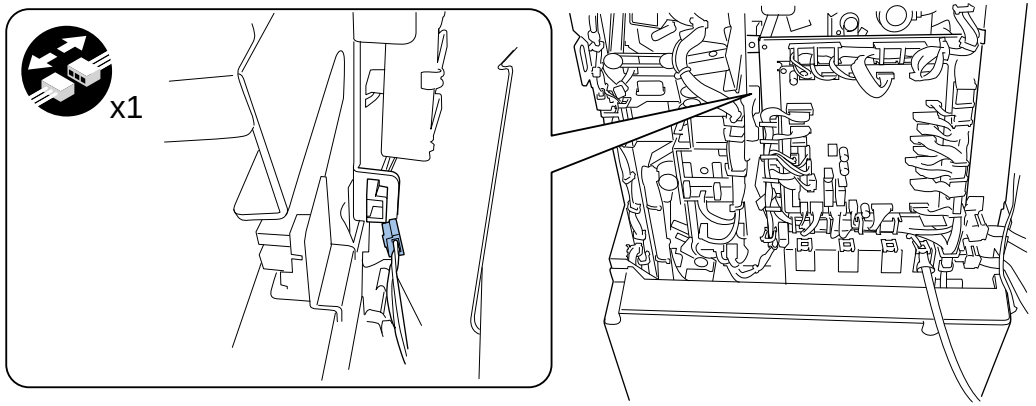
F-3-4

5) Remove the 2 finisher controller PCB connectors (CN127, CN128). Remove the punch unit cable from 7 locations of the cable guide and remove the reuse band.



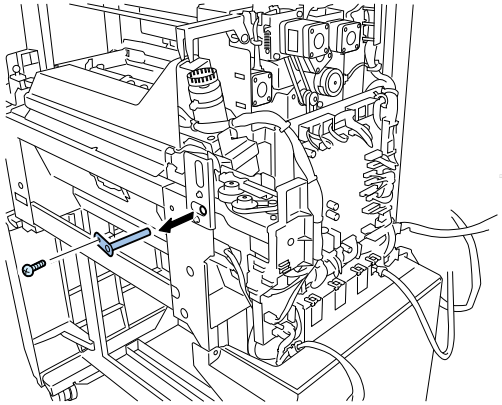
F-3-5

6) Pull out the punch unit cable connector.



F-3-6

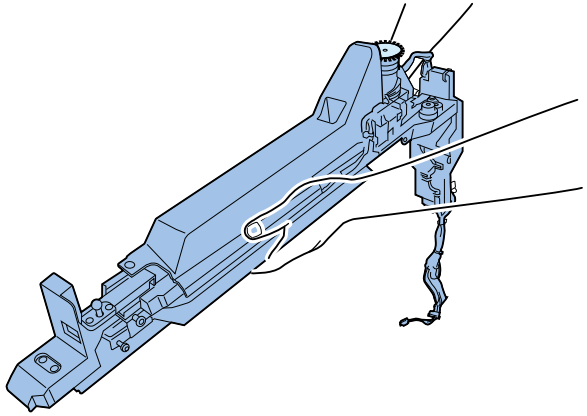
7) Remove 1 screw and remove the punch unit securing pin.



F-3-7

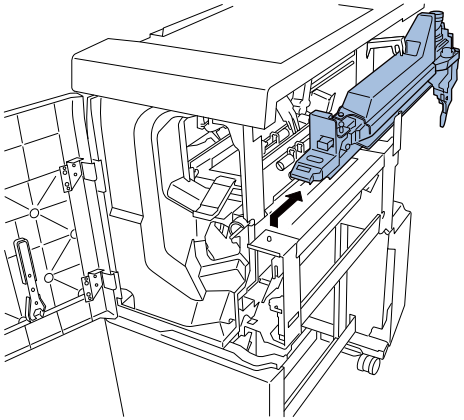
Note:

- Hold the punch unit at the locations shown below.
- Do not hold the motor gear.



F-3-8

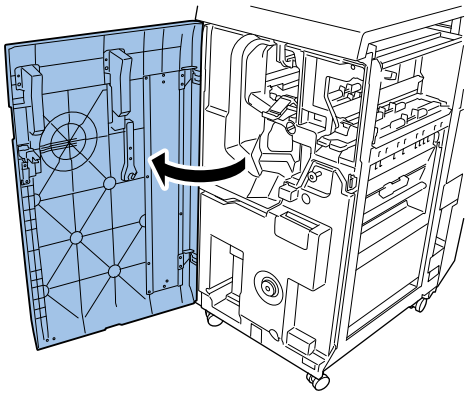
8) Remove the punch unit from the finisher.



F-3-9

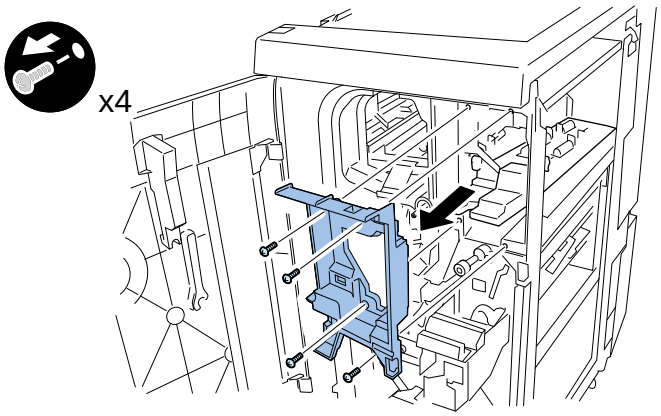
Removing from the saddle finisher

1) Open the finisher front door.



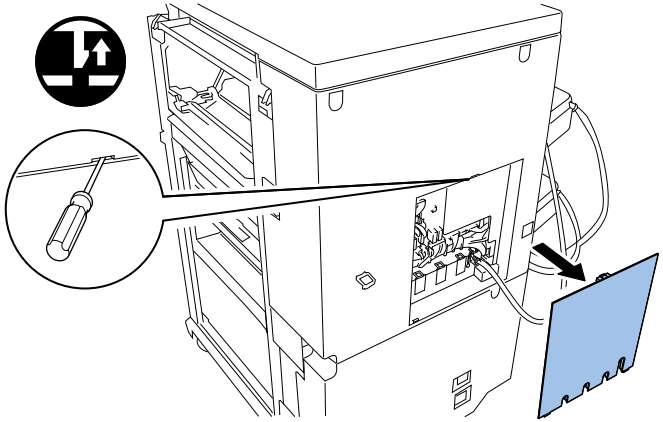
F-3-10

2) Remove 4 screws and remove the inner top cover.



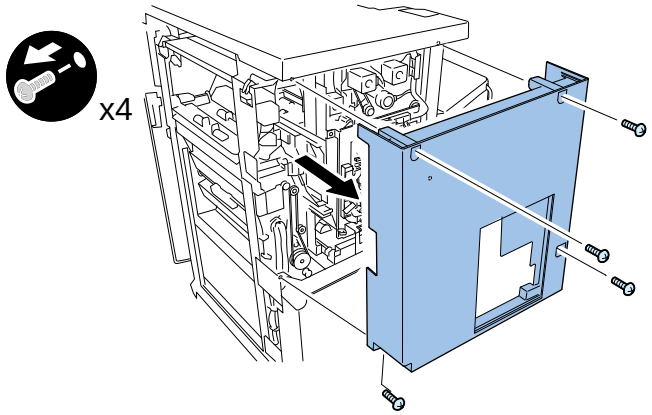
F-3-11

3) Remove the finisher rear center cover with a flat head screwdriver.



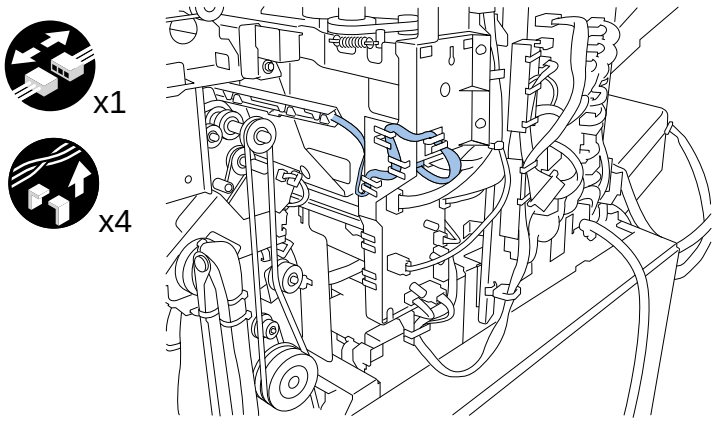
F-3-12

4) Remove 4 screws and remove the finisher rear cover.



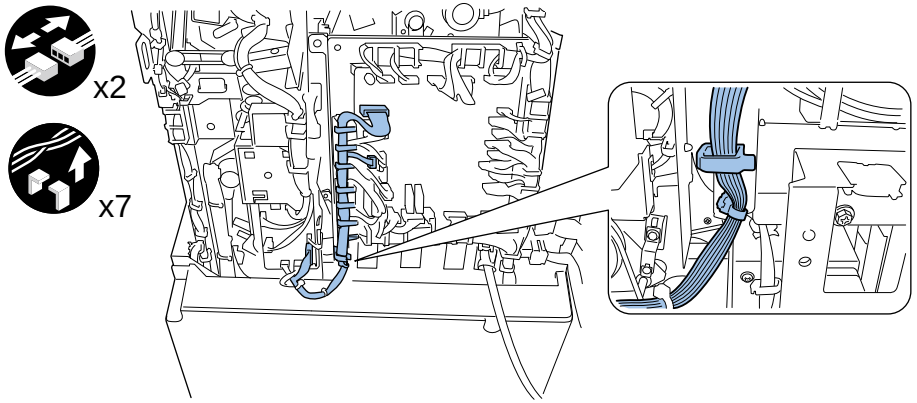
F-3-13

5) Remove the punch controller PCB connector (CN4) and remove the punch waste full sensor cable from the cable guide.



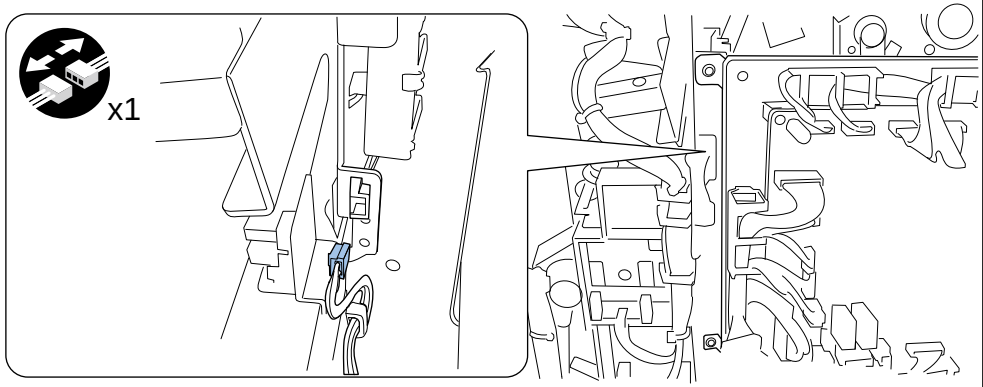
F-3-14

6) Remove the 2 finisher controller PCB connectors (CN127, CN128). Remove the punch unit cable from 7 locations of the cable guide and remove the reuse band.



F-3-15

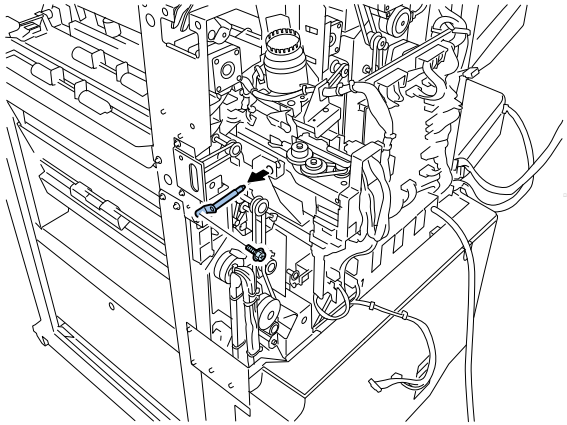
7) Pull out the punch unit cable connector.



F-3-16

8) Remove 1 screw and remove the punch unit lock pin.

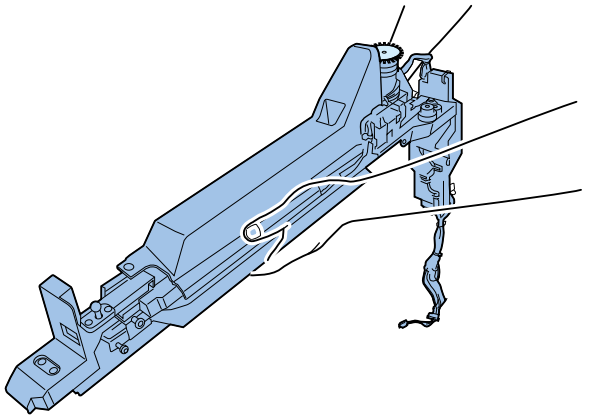
x1



F-3-17

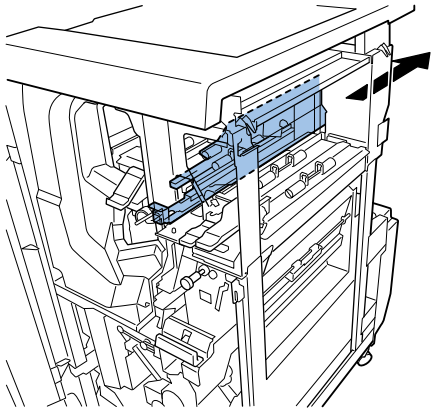
Note:

- Hold the punch unit at the locations shown below.
- The punch front cover is not attached when removing the punch unit from the saddle finisher, but the punch unit holding location is the same.
- Do not hold the motor gear.



F-3-18

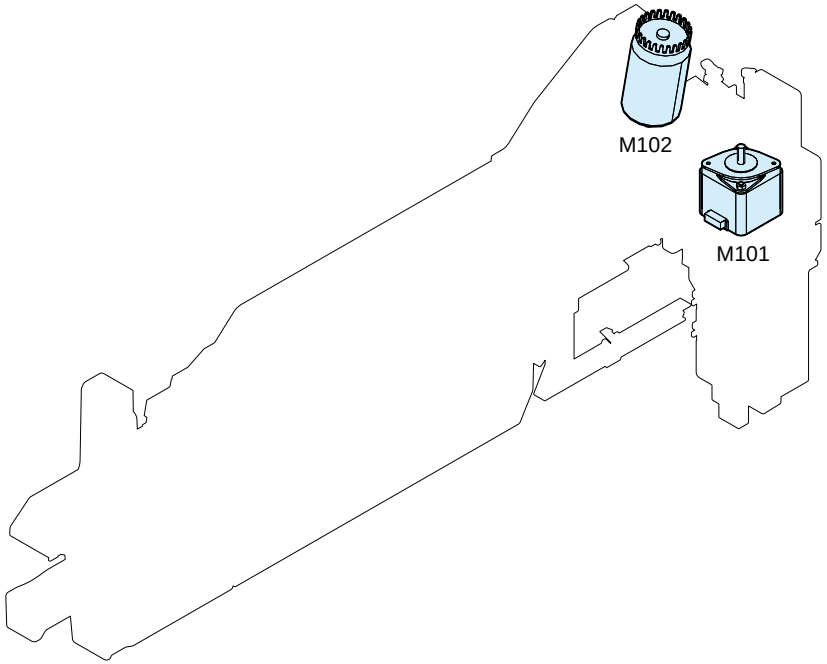
9) Remove the punch unit from the finisher.



F-3-19

List of Parts

Motors



F-3-20

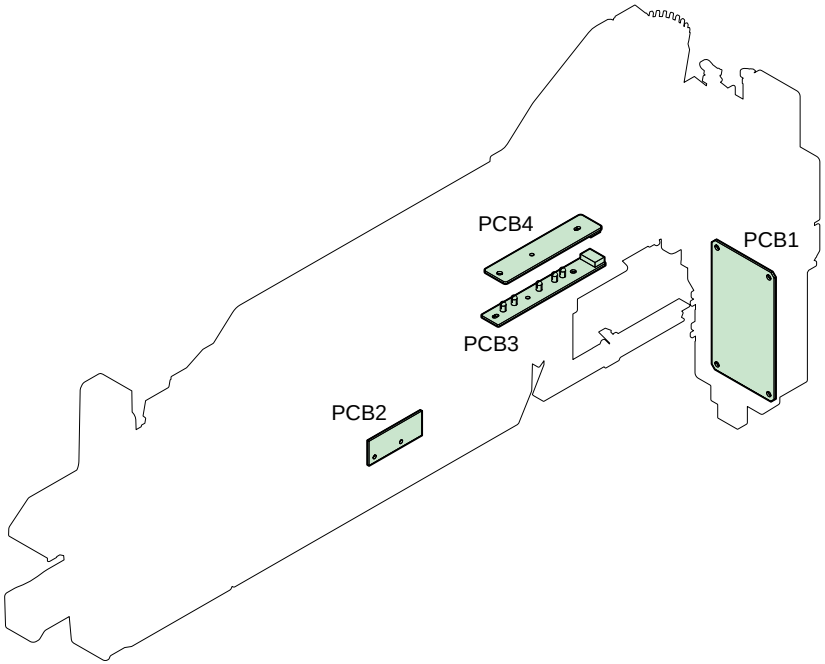
No.	Parts name	Parts number	Reference
M101	Punch slide motor	FK2-8196	-
M102	Punch motor	FK2-8197	-

Sensors

F-3-21

No.	Parts name	Parts number	Reference
S101	Horizontal registration HP sensor	WG8-5823	-
S102	Punch position sensor	WG8-5823	-
S103	Punch 2-/3-hole sensor	WG8-5823	-
S104	Punch HP sensor	WG8-5823	-
S105	Punch motor clock sensor	WG8-5823	-
S106	Inlet sensor	WG8-5854	-

PCBs



F-3-22

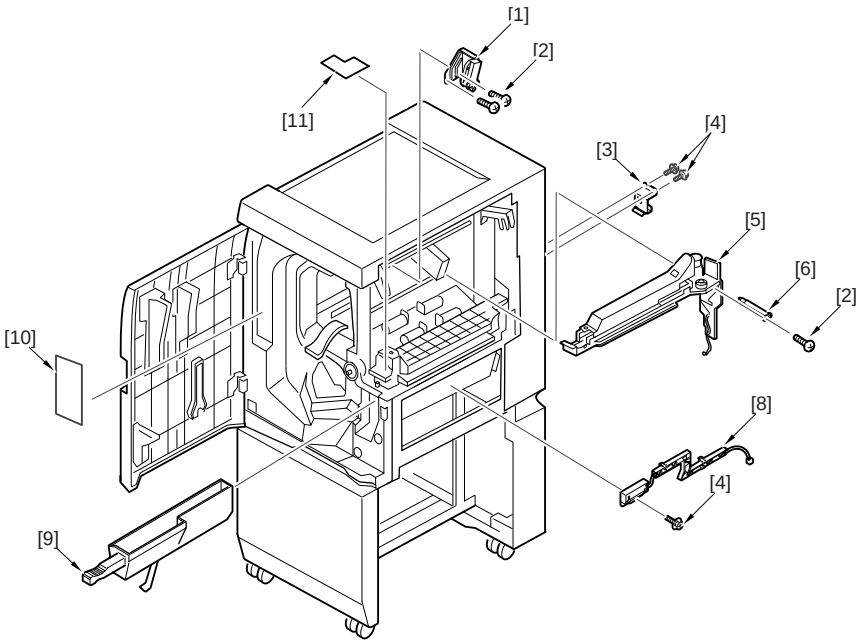
No.	Parts name	Parts number	Reference
PCB1	Puncher driver PCB	FM4-0310	-
PCB2	Panch waste full detection PCB	FM4-0311	-
PCB3	LED PCB	FM4-0312	-
PCB4	Photosensor PCB	FM4-0313	-

4 Installation

- Checking the Contents
- Installation Procedure

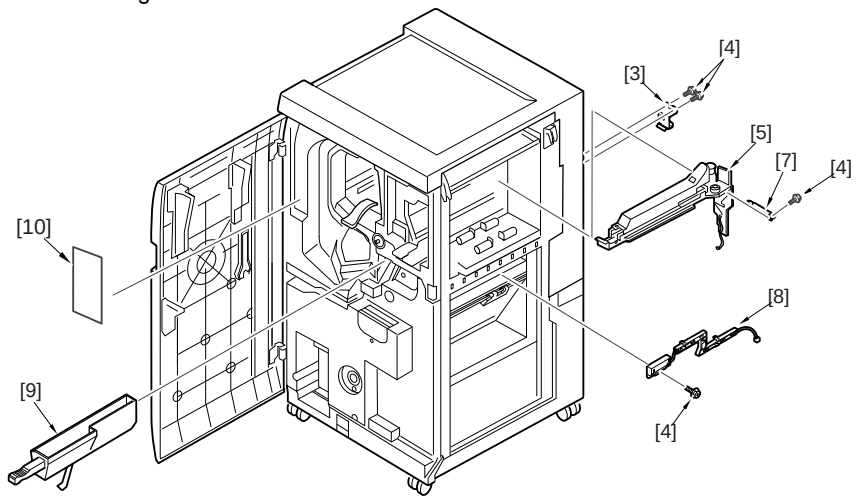
Checking the Supplied Parts

- When attaching to the finisher (without a saddle unit)



F-4-1

- When attaching to the saddle finisher



F-4-2

☐[1] Punch opening retaining plate	1 pc.*1
☐[2] Screw (Bind-head, M4 x 6)	3 pcs*1
☐[3] Punched waste paper box fixing plate	1 pc.
☐[4] Screw (TP, M3 x 6)	4 pcs*2
☐[5] Punch unit	1 pc.
☐[6] Punch unit fixing pin (for finisher)	1 pc*1
☐[7] Punch unit fixing pin (for saddle finisher)	1 pc.
☐[8] Punched waste paper full sensor unit	1 pc
☐[9] Punched waste paper box	1 pc.
☐[10] Label 1	1 pc.
☐[11] Label 2	1 pc.

*1: These are not used when attaching this unit to the saddle finisher.

*2: Only three screws are used when attaching this unit to the finisher.

Installation Procedure

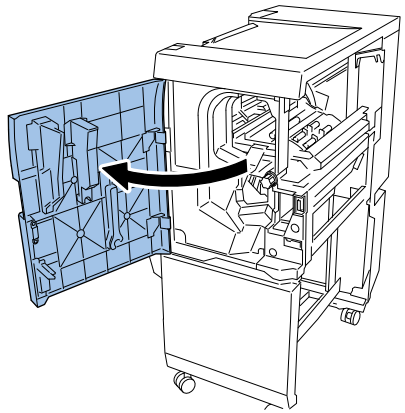
When attaching to the finisher (without a saddle unit)

MEMO:

- The equipment is secured with packaging tapes and cushioning materials to protect it against vibration and shock during transportation. Remove all packaging tapes and cushioning materials before installing the equipment.
- When attaching to the saddle finisher, refer to B, “When attaching to the saddle finisher”.

☐ 1

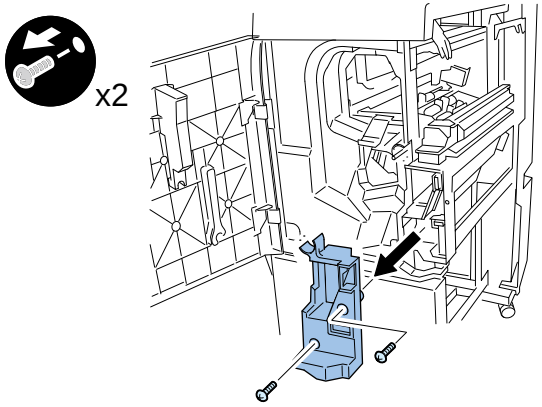
1) Open the front door of the finisher.



F-4-3

☐ 2

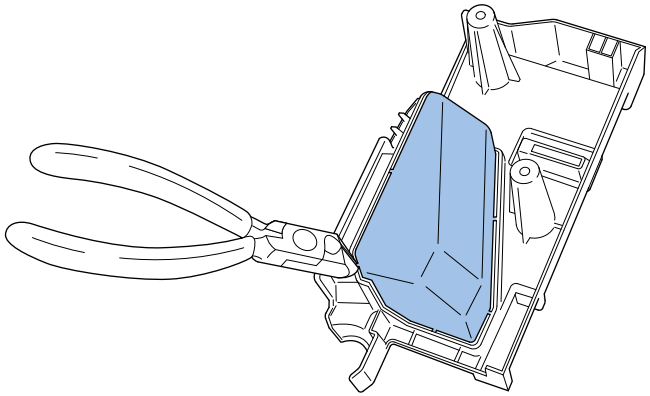
2) Remove two screws, and then remove the inner upper cover.



F-4-4

☐ 3

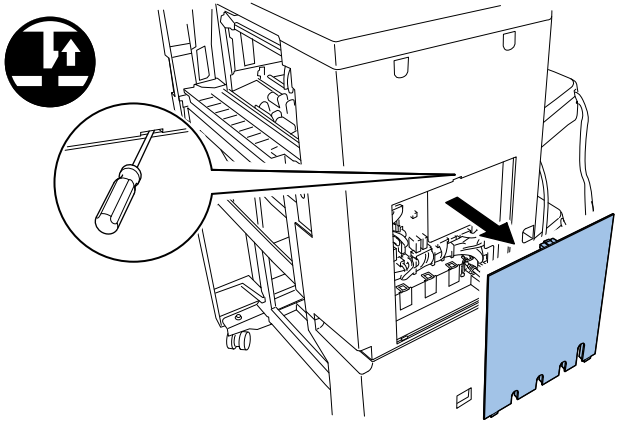
3) Using a nipper, cut out the face cover of the waste paper box from the inner upper cover.



F-4-5

☐ 4

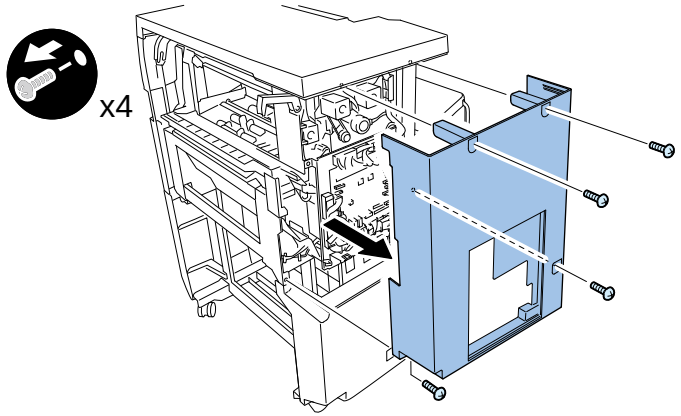
4) Using a flat-blade screwdriver or the like, remove the rear middle cover of the finisher.



F-4-6

☐ 5

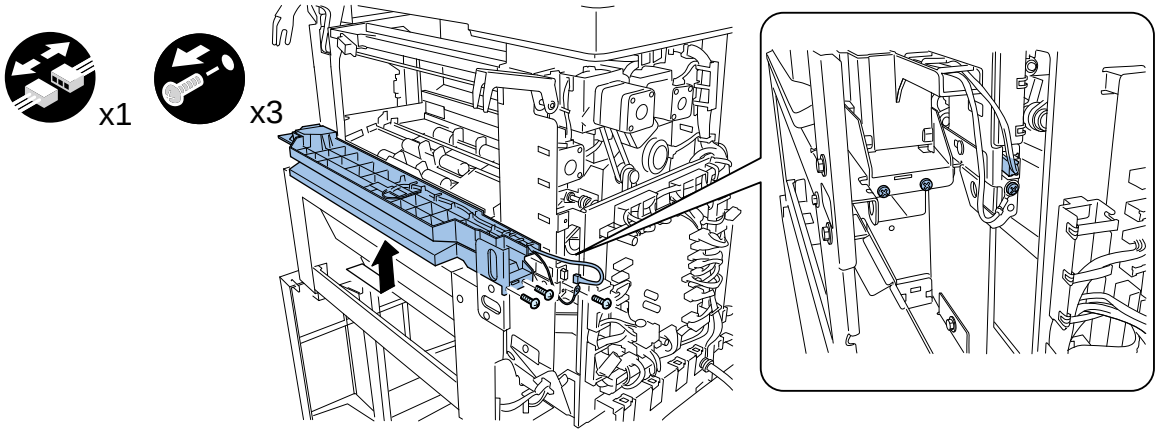
5) Remove four screws, and then remove the finisher rear cover.



F-4-7

☐ 6

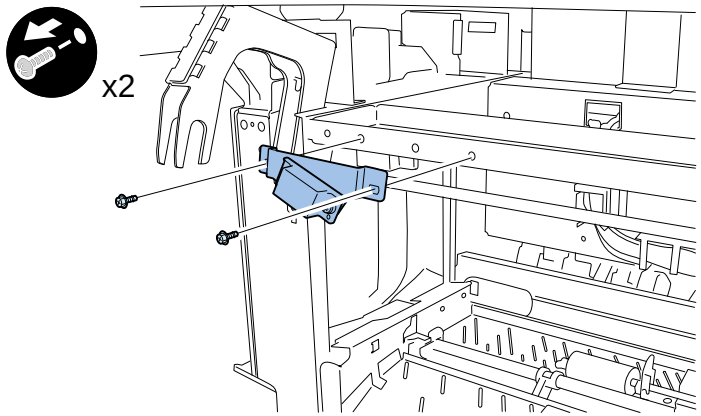
6) Disconnect one connector, remove three screws, and remove the feed unit. (The feed unit/the three screws are no longer required.)



F-4-8

☐ 7

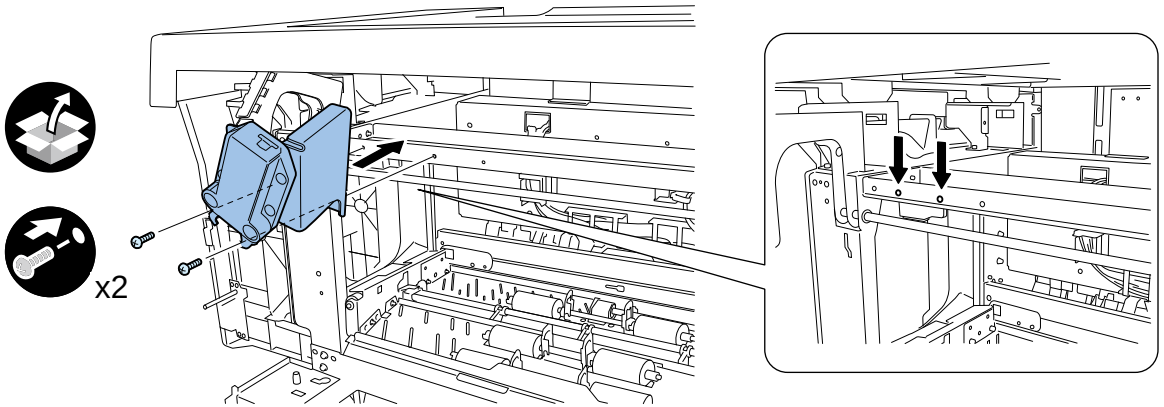
7) Remove two screws, and then remove the magnet plate. (The magnet plate/the two screws are no longer required.)



F-4-9

☐ 8

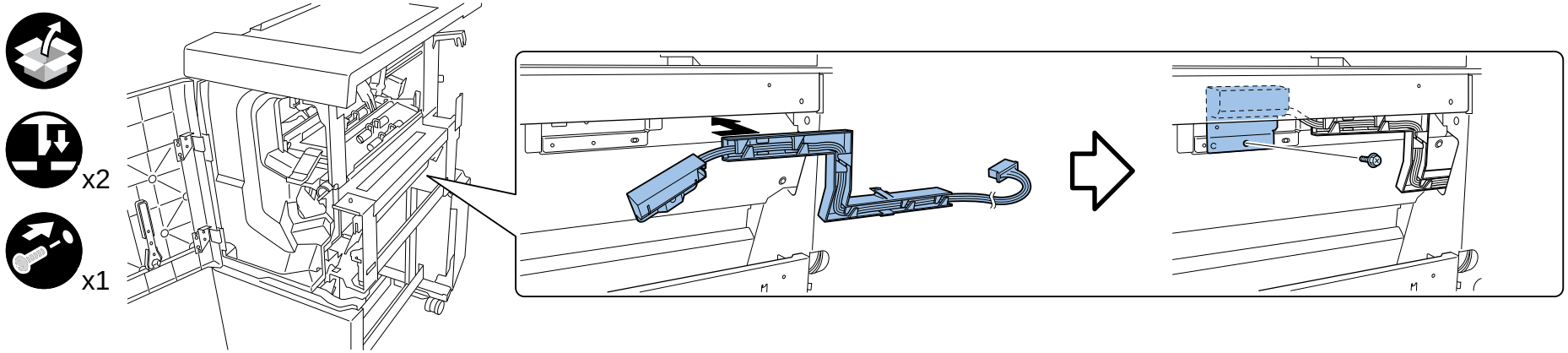
8) Using the two supplied screws (Bind-head, M4 x 6), install the included punch opening retaining plate.



F-4-10

☐ 9

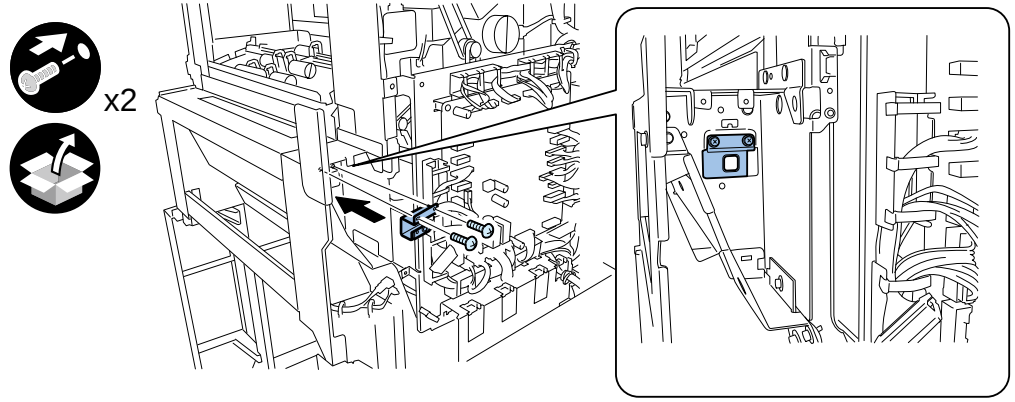
9) Install the harness guide of the supplied punched waste paper full sensor unit.
Using the supplied screw (TP, M3 x 6), install the punched waste paper full sensor.



F-4-11

☐ 10

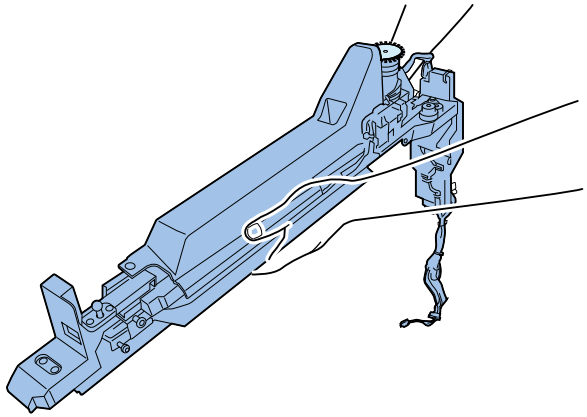
10) Using the supplied two screws (TP, M3 x 6), install the punched waste paper box fixing plate.



F-4-12

CAUTION:

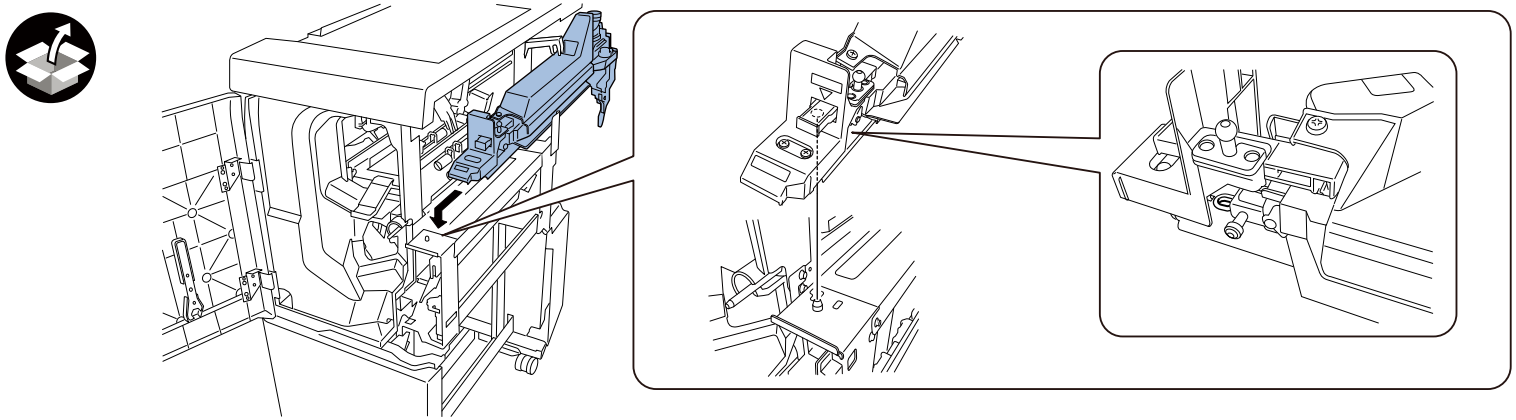
- Hold the punch unit as shown below.
- Do not hold the motor gear assembly.



F-4-13

☐ 11

11) Attach the supplied punch unit to the finisher. Align the holes on the front side of the punch unit with the pins on the finisher.

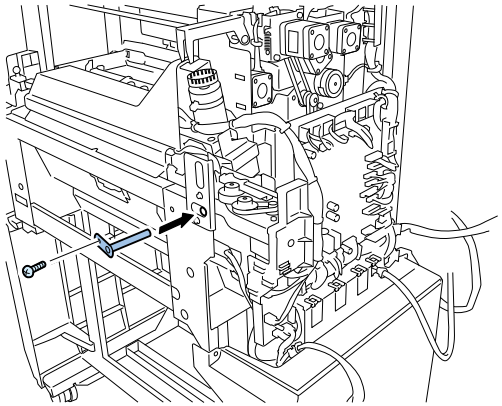


F-4-14

☐ 12

12) Install the supplied punch unit fixing pin, and then secure it with the supplied screw (Bind-head, M4 x 6).

x1

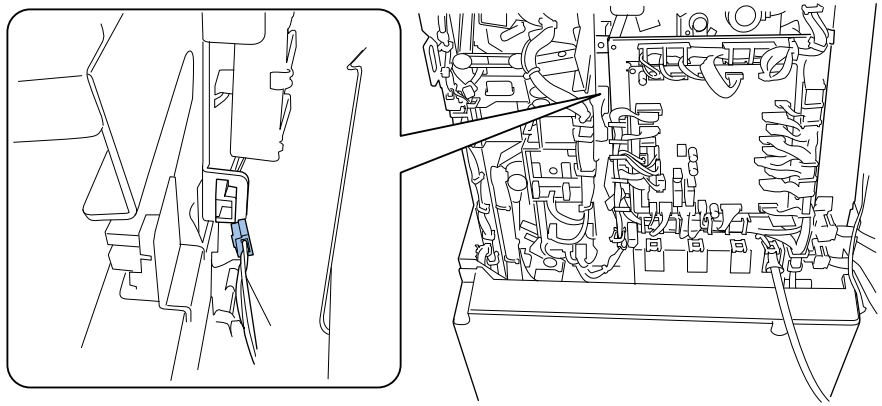


F-4-15

☐ 13

13) Connect the punch unit harness to the connector.

x1



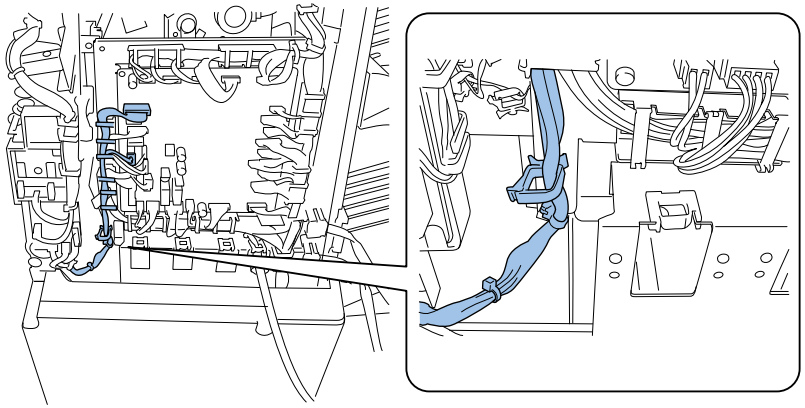
F-4-16

☐ 14

14) Lace the punch unit harness through seven cable guides, and then attach the re-use band. Connect the punch unit connectors to the two connectors (CN127 and CN128) on the finisher controller PCB.

x7

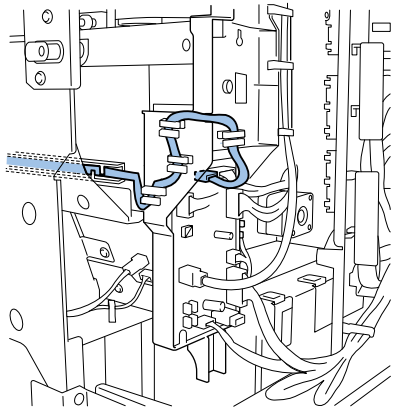
x2



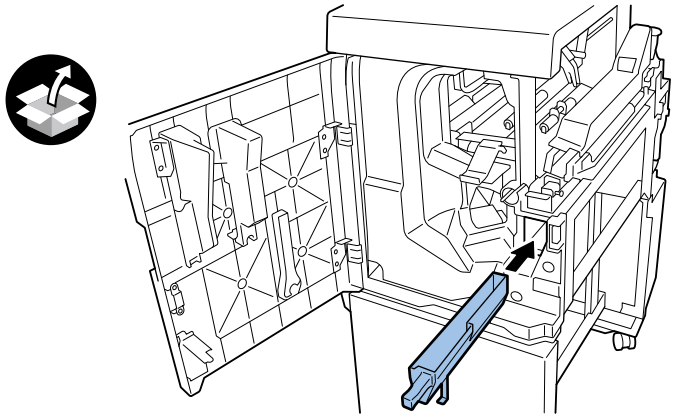
F-4-17

☐ 15

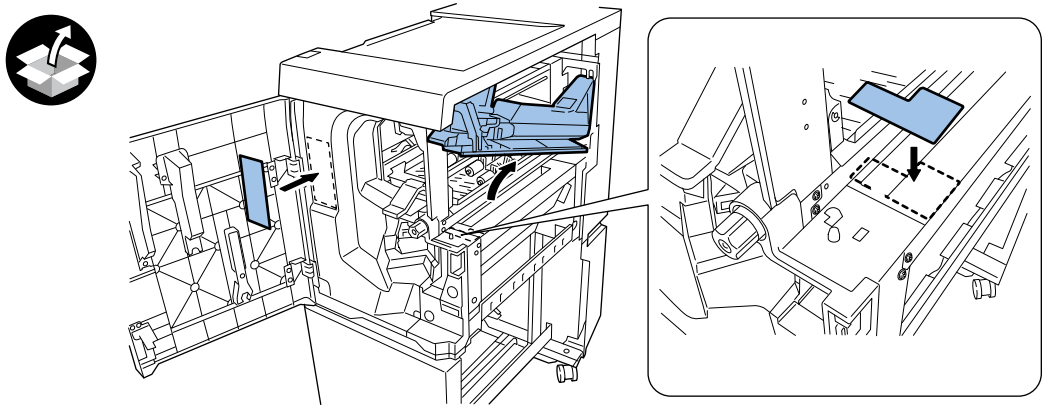
15) Connect the punched waste paper full sensor harness connector to the connector (CN4) on the punch controller PCB.



F-4-18

☐ 16 16) Install the finisher rear cover using four screws.	☐ 17 17)Install the finisher rear middle cover.	☐ 18 18) Install the inner upper cover using two screws.	☐ 19 19) Install the supplied punch waste paper box.  F-4-19	☐ 20 20) The following parts will be no longer needed once the puncher unit has been installed. • Two screws (RS-tight, M4 x 6) • Magnet plate • Punch unit fixing pin (for saddle finisher) • Three screws (TP, M3 x 6) • Feed unit

Attaching the Labels

☐ 1 1) Raise the puncher unit. Affix the supplied labels at the positions shown below. - Peel the label from the separator on which "A" is printed, and then affix it to the cover in the finisher. - Affix the label printed in the user specified language under the puncher unit.  F-4-20	☐ 2 2) Close the front door of the finisher.

Operation Check

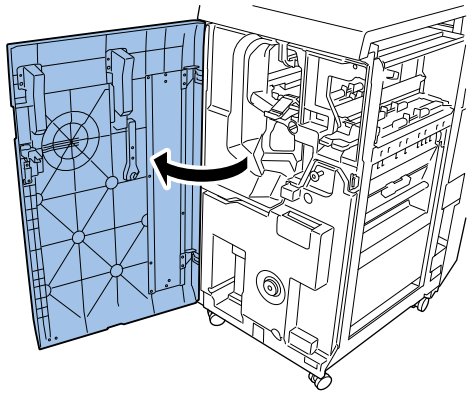
After completion of installation, punch holes by operating the console panel to check whether punch unit operates normally.

When attaching to the saddle finisher

MEMO:
The equipment is secured with packaging tapes and cushioning materials to protect it against vibration and shock during trans-portation. Remove all packaging tapes and cushioning materials before installing the equipment.

☐ 1

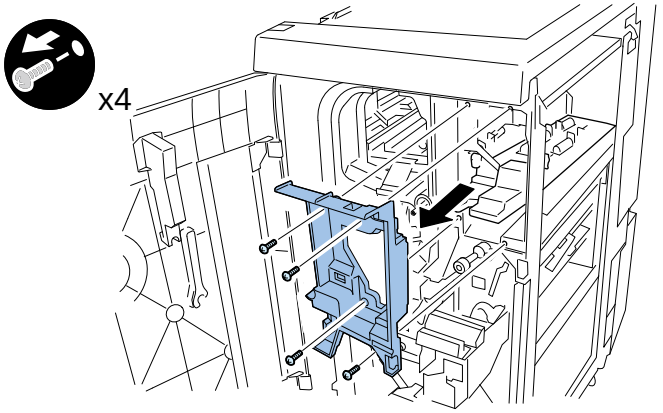
1) Open the front door of the finisher.



F-4-21

☐ 2

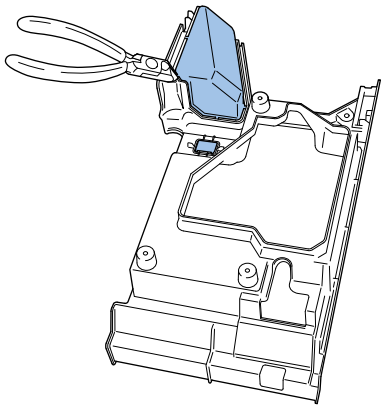
2) Remove four screws, and then remove the inner upper cover.



F-4-22

☐ 3

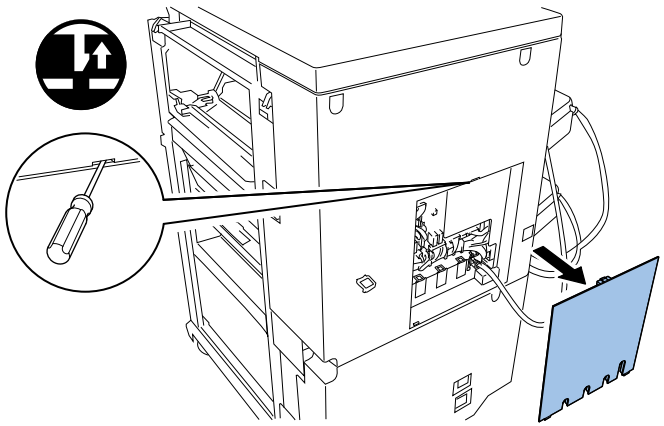
3) Using a nipper, cut out the face cover of the waste paper box on the inner upper cover.



F-4-23

☐ 4

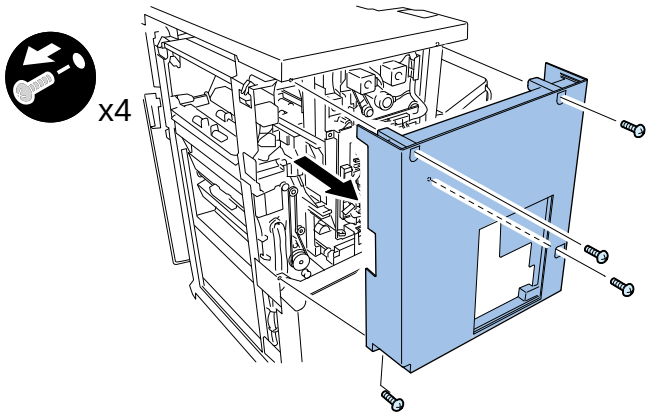
4) Using a flat-blade screwdriver or the like, remove the rear middle cover of the finisher.



F-4-24

☐ 5

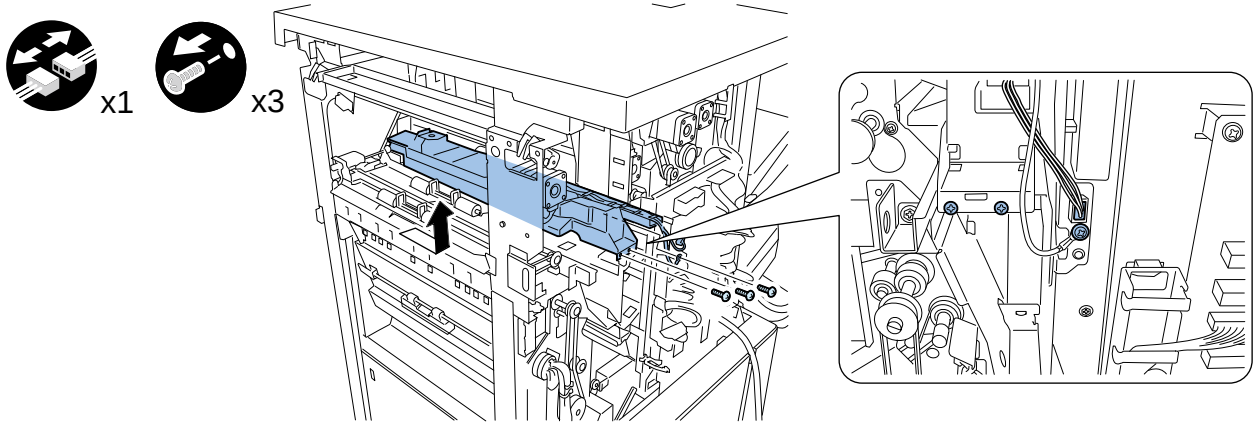
5) Remove four screws, and then remove the finisher rear cover.



F-4-25

☐ 6

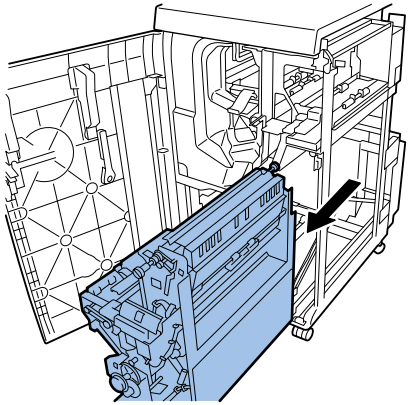
6) Disconnect one connector, remove three screws, and remove the feed unit.(The feed unit/the three screws are no longer required.)



F-4-26

☐ 7

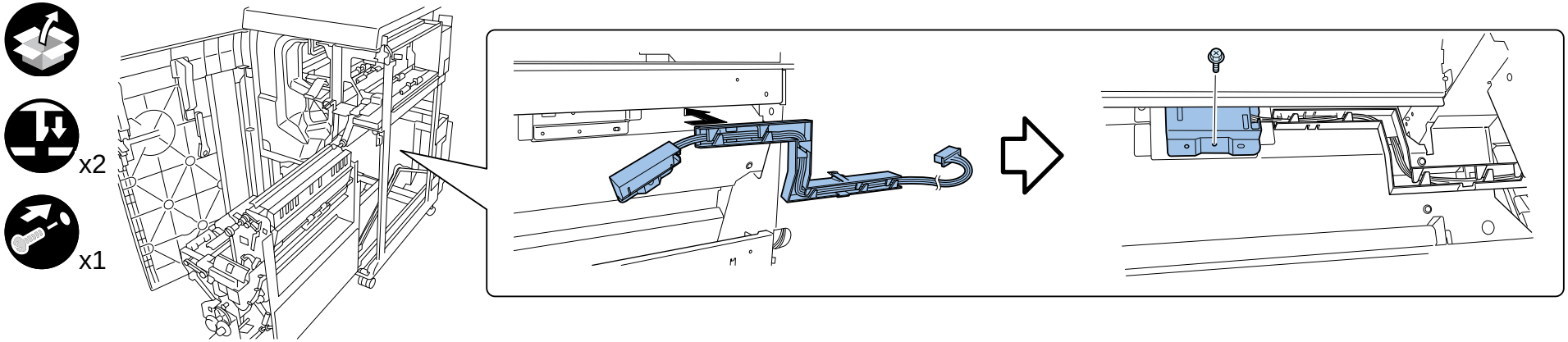
7) Draw out the saddle unit as far as possible.



F-4-27

☐ 8

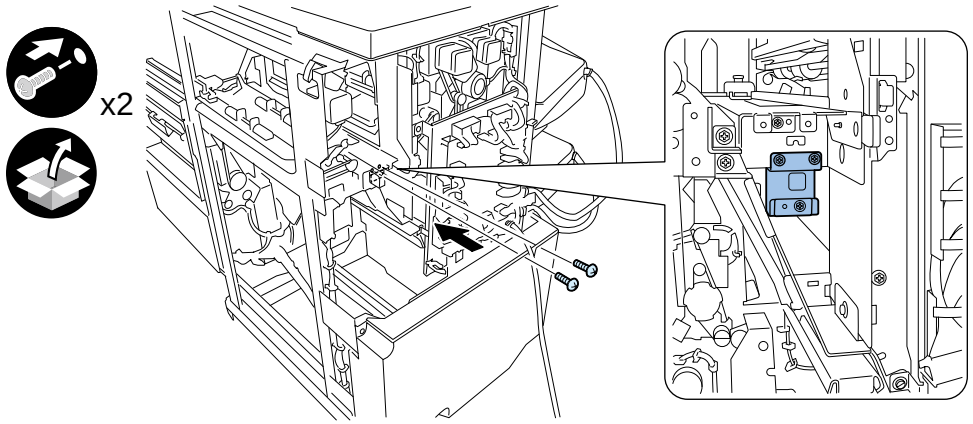
8) Install the harness guide of the supplied punched waste paper full sensor unit.
Using the supplied screw (TP, M3 x 6), install the punched waste paper full sensor.



F-4-28

☐ 9

9) Using the supplied two screws (TP, M3 x 6), install the punched waste paper box fixing plate.



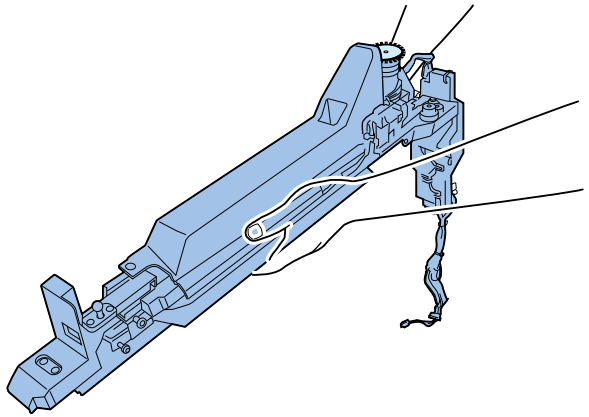
F-4-29

☐ 10

10) Install the saddle unit at the original position.

CAUTION:

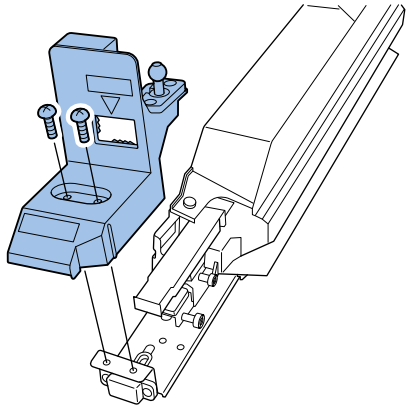
- Hold the punch unit as shown below.
- Do not hold the motor gear assembly.



F-4-30

☐ 11

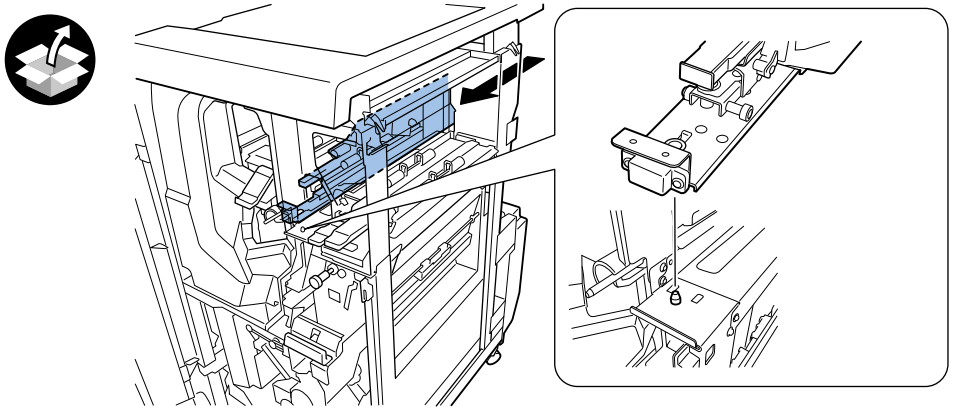
11) Remove the two scews, and then remove the punch front cover.(The two screws/the punch front cover are no longer required.)



F-4-31

☐ 12

12) Attach the supplied punch unit to the finisher. Align the holes on the front side of the punch unit with the pins on the finisher.

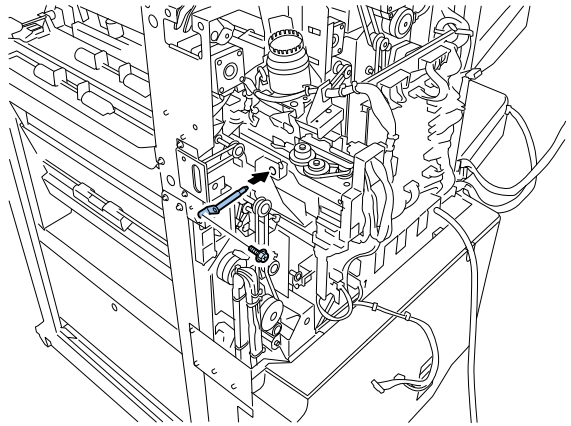


F-4-32

☐ 13

13) Install the supplied punch unit fixing pin, and then secure it with the suppied screw (TP, M3 x 6).

x1

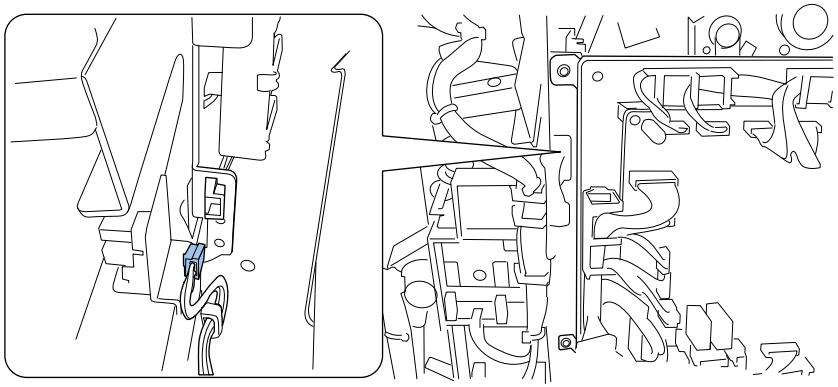


F-4-33

☐ 14

14) Connect the punch unit harness to the connector.

x1



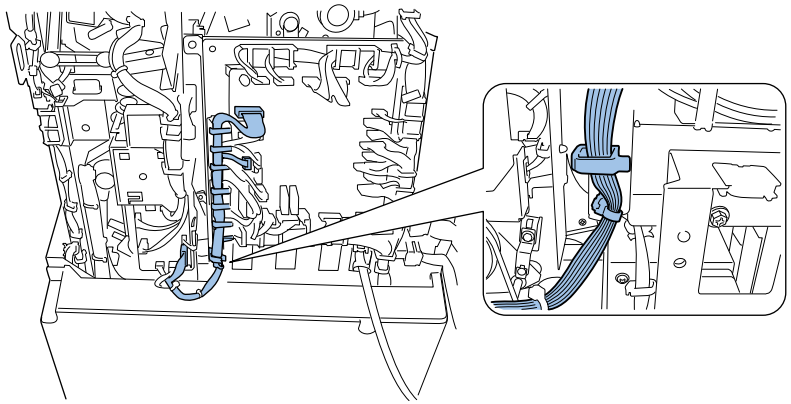
F-4-34

☐ 15

15) Lace the punch unit harness through seven cable guides, and then attach the re-use band. Connect the punch unit connectors to the two connectors (CN127 and CN128) on the finisher controller PCB.

x7

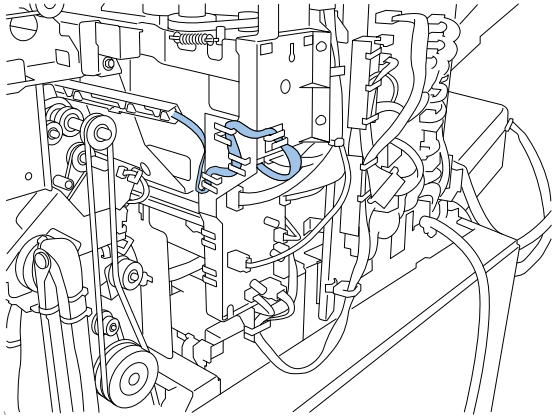
x2



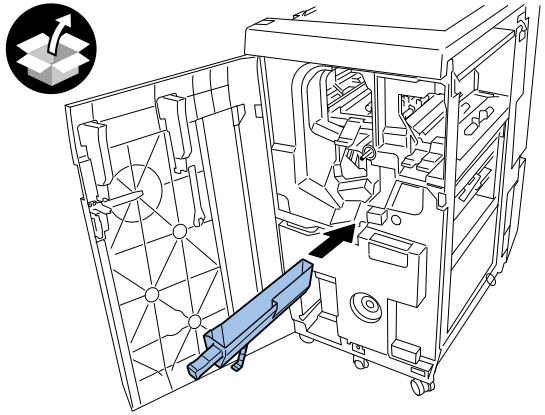
F-4-35

☐ 16

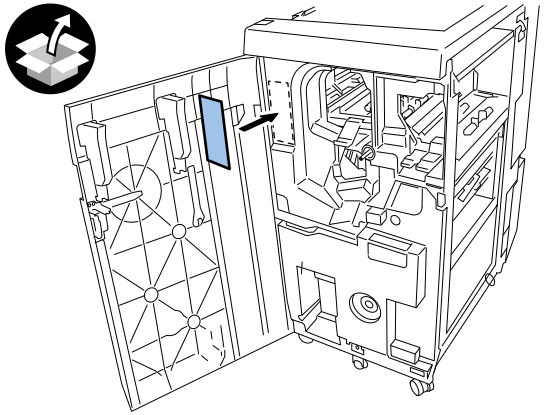
16) Connect the punched waste paper full sensor harness connector to the connector (CN4) on the punch controller PCB.



F-4-36

☐ 17 17) Install the finisher rear cover using four screws.	☐ 18 18)Install the finisher rear middle cover.	☐ 19 19) Install the inner upper cover using four screws.	☐ 20 20) Install the punched waste paper box.  F-4-37	☐ 21 21) The following parts will be no longer needed once the puncher unit has been installed. • Punch opening retaining plate • Six screws (Bind-head, M4 x 6) • Punch unit fixing pin (for finisher) • Label 1 • Three screws (TP, M3 x 6) • Feed unit • Punch front cover

Attaching the Label

☐ 1 1) Install the punched waste paper box.  F-4-38	☐ 2 2) Close the front door of the finisher.

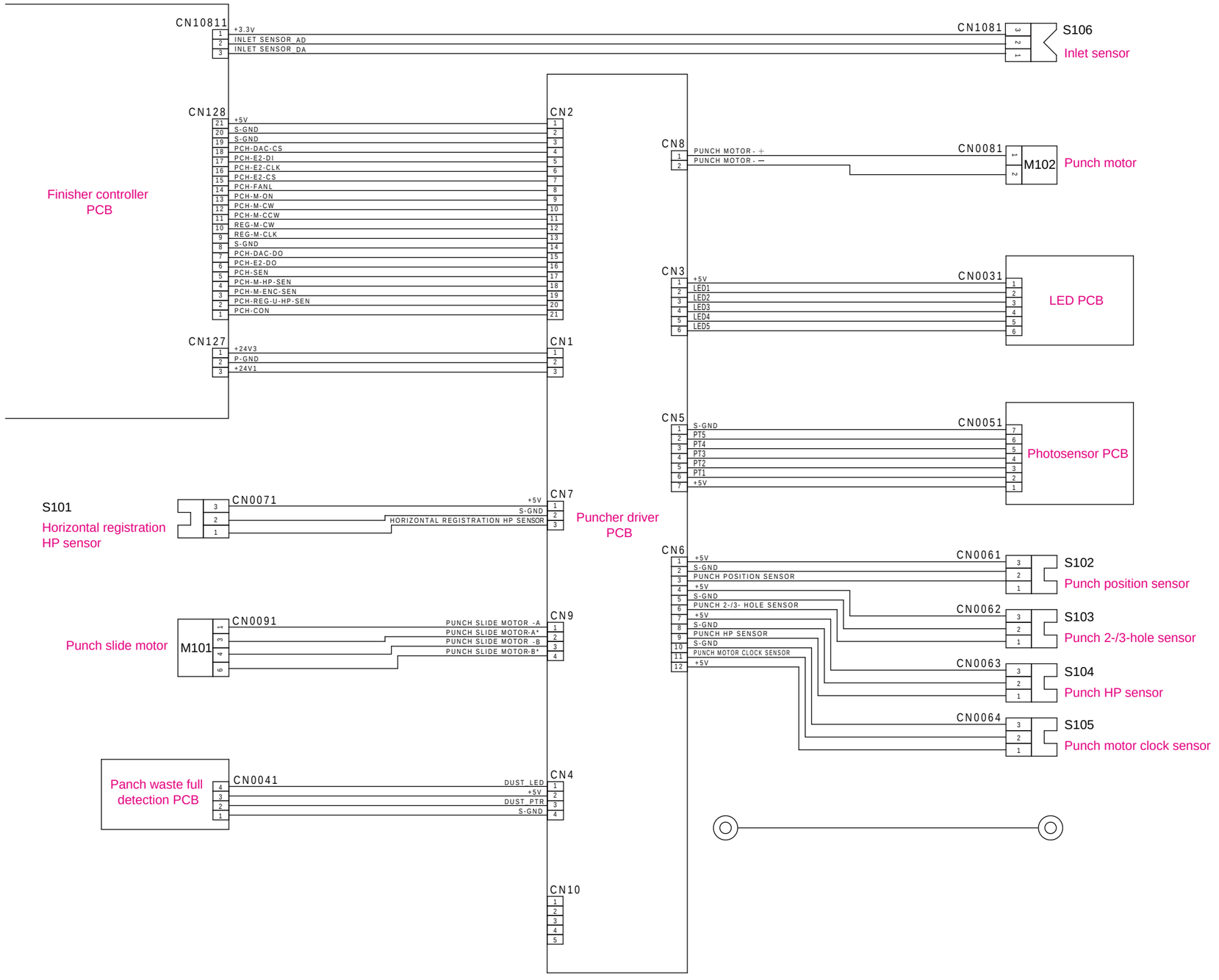
5

Appendix

General Circuit Diagram

General Circuit Diagram

General Circuit Diagram



F-5-1